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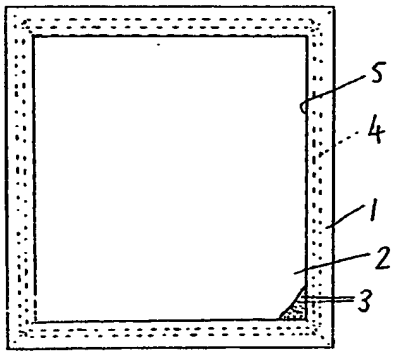
(54) **Fly screen**

(57) A screen for excluding insects is formed of perforated transparent plastics film. Where the screen is to exclude insects from penetrating a door or window opening 5, it may be put in place using any suitable means such as double-sided adhesive tape 4 and the film 3 may subsequently be heat shrunk in situ.



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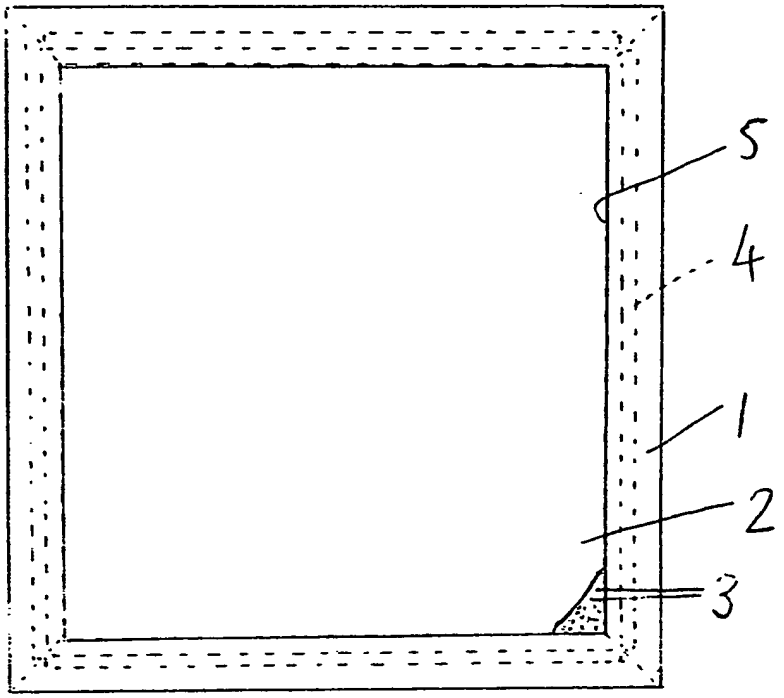
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SPECIFICATION

Window screen

The present invention relates to a screen, and in particular to a screen which can be placed over an opening such as a window or door to allow light to pass through but to exclude insects.

Traditionally insects have been excluded by the use of either a fine mesh woven fabric or a fine mesh metal screen. However, although these two known solutions have been used for many decades, there has always been the disadvantage that the light transmissivity of the screen is poor.

A screen of the fabric or metal type has previously been employed during warmer climatic conditions and is normally able to be removed from the frame around the aperture when it is not required (for example in colder weather) and when there is less intense day-light which is to be impeded to the minimum extent possible.

It is also known to use secondary glazing in colder climatic conditions, where a removable glazed frame is able to be placed over a window opening to form a sound-deadening or thermally-insulating pocket of air between the main glazing of the window and a secondary glazing.

It has also been proposed, in the past, to provide this secondary glazing in the form of a plastics film temporarily held in place on the window frame, for example as disclosed in U.S. Patent No. 3,075,248 where a sheet of shrink film has been clamped in place over the window opening and then shrink-tidied, for example by use of a domestic hair-dryer.

In the past these two different applications, the secondary glazing on the one hand, and the insect screen on the other hand have been used in different seasonal conditions and for entirely different uses.

According to one aspect of the present invention we provide a method of excluding insects, comprising providing an air-permeable screen of perforated transparent plastics material, the perforations being small enough to exclude undesirable insects.

A second aspect of the invention provides a method of providing an insect-exclusion screen over an aperture, comprising stretching a film of transparent plastics material over the aperture, the film having been finely perforated so as to be air-permeable but to exclude undesirable insects.

A further aspect of the present invention provides a kit of parts for screening an aperture, comprising a sheet of finely perforated transparent plastics film, the fineness of the perforations being adequate to render the film air-permeable but to prevent undesirable insects from penetrating the film, and means for securing the film in place over an aperture, the film being heat-shrinkable.

Yet a further aspect of the present invention provides an air-permeable insect exclusion screen comprising a sheet of transparent perforated film stretched taut over an aperture to exclude insects from passing through the aperture.

Preferably the film is secured directly to the perimeter of the aperture without the need for any removable supporting frame to carry the film.

Advantageously the film is a heat-shrinkable film which has been brought into the taut condition by application of heat after the film has been put in place.

In order that the present invention may more readily be understood the following description is given, merely by way of example, with reference to the accompanying drawing in which the sole Figure shows a sheet of perforated plastic film stretched taut over a window frame, in accordance with the present invention.

The drawing shows the window frame 1 having a film 2 stretched taut over the window aperture, the film 2 including a plurality of perforations 3 as shown schematically in the bottom righthand corner of the window.

The window frame comprises four members defining a rectangular aperture and parallel to each of these members is a securing strip 4, in this case double-sided adhesive tape having one adhesive face to bond to the window frame and the other to attach to the plastics sheet. Any other securing means can be used instead of adhesive tape.

Although, in the drawing, the plastics sheet 2 has a neat rectangular perimeter which coincides with the perimeter of the window frame 1 itself, it will of course be understood that in practice the film may be slightly smaller than or slightly greater than the external perimeter of the frame, provided of course that the film adequately closes the aperture 5 of the window frame.

In the preferred embodiment of the window screen, the film 2 is initially placed in contact with the frame 1 in a substantially flat configuration but not under any appreciable tension, and then heat is applied, for example by way of a domestic hairdryer, to shrink the film in place. For this operation it is necessary that the film used be of a heat-shrinkable type in which latent shrink energy imparted to the film by bi-directional orientation of the film can be released by the application of shrinking heat.

In this preferred example the shrink film, which is highly transparent, additionally includes an optional ultra-violet absorber as a means of screening the occupants of the room against ultra-violet radiation, while allowing the maximum possible transmission of visible light.

The film may be mechanically perforated by means of hot needles, or flame-perforated, or perforated in any other manner, as desired.

Although in the preferred example there is no separate frame to hold the perforated transparent film in place, it is conceivable for such a frame to be provided and it may be particularly advantageous for the frame to be enclosed within a tube of the perforated plastics film such that the film may be heat-shrunk onto the frame to provide the necessary tightness of the film on the frame.

Various examples of plastics composition for the film may be used, and the film may either be a mono-component film or a multi-layer film.

For example, one suitable film may be of shrinkable polyethylene.

Another example is a four-ply co-extruded shrinkable film having a thickness of from 15 to 30 microns and a composition A/B/A/B where:—

A is polypropylene; and

B is 85% propylene-ethylene (as a 96/4 co-polymer) and 15% polypropylene.

Yet a further example of a suitable film is a three-ply co-extruded shrinkable film having a thickness of from 15 to 30 microns and composition A/C/A where:—

A is polypropylene; and

C is linear low-density polyethylene.

Yet a further suitable film is linear medium density polyethylene having a thickness of from 15 to 30 microns, and irradiated to an intensity of 6 Megarads. This film is shrinkable.

One particularly preferred composition is linear medium density polyethylene irradiated to an intensity of 10 Megarads, with a thickness of 25 microns.

Such a film is sold by Minnesota Mining and Manufacturing Company under the Trade designation "RD101". Naturally, each of these varieties of film will have been perforated to give holes which are preferably smaller than the size of a mosquito. For example, there may be 200 holes per square inch (31 holes per square centimeter) each having a diameter of 0.9 mm.

Although the aperture 5 is shown as unobstructed, it will of course be appreciated that the conventional window casements or sashes have been omitted, for clarity.

Furthermore, the same principle of mounting the insect-excluding film in place over a window opening can be extended to the provision of an insect screen in a doorway.

Although in the preferred embodiment described above the use of plastics film has been disclosed for an insect-excluding screen in a window aperture, it is of course possible to use the perforated film in a door aperture or in other insect-exclusion applications, in place of conventional mosquito netting. For example, in some tropical areas mosquito netting is placed over a bed to protect the occupant against insect attack while sleeping, and the perforated transparent plastics film used to screen the window aperture 5 in the drawing can be used for that alternative application.

If desired, the film used may be tinted, for example by means of a coloured resin, and may then serve as a sun-screen. Alternatively or additionally the film may be printed, in order to provide a decorative effect or for any other purpose. By 'printed' we mean that the film bears a printed image on an 'image-bearing' part of its surface area, and is plain on the 'non image-bearing' remainder of its surface.

CLAIMS

1. A method of excluding insects, comprising providing an air-permeable screen of perforated transparent plastics material, the perforations being small enough to exclude undesirable insects.

2. A method of providing an insect-exclusion screen over an aperture, comprising stretching a film of transparent plastics material over the aperture, the film having been finely perforated so as to be air-permeable but to exclude undesirable insects.

3. A method according to claim 3, wherein the step of stretching the film taut over the aperture comprises attaching a heat-shrinkable film to a wall or a frame around the perimeter of the aperture to be screened, and then applying shrinking heat to the film to impart the required tension in the film.

4. A method according to claim 3, wherein the shrinking heat is applied to the film by means of a domestic hairdryer.

5. A method according to any one of the preceding claims, wherein the film has been perforated by use of hot needles.

6. A process according to any one of claims 1 to 4, wherein the film has been perforated by a flame perforation process.

7. A kit of parts for screening an aperture, comprising a sheet of finely perforated transparent plastics film, the fineness of the perforations being adequate to render the film air-permeable but to prevent undesirable insects from penetrating the film, and means for securing the film in place over an aperture, the film being heat-shrinkable.

8. A kit according to claim 7, wherein the film is shrinkable polyethylene irradiated to at least 6 Megarads.

9. A kit according to claim 7 or 8, wherein the film has a thickness of from 15 to 30 microns.

10. A kit according to any one of claims 7 to 9, wherein the film is perforated with substantially 31 holes per square centimeter.

11. A kit according to any one of claims 7 to 10, wherein the perforation holes have a maximum diameter of 0.9 mm.

12. A kit according to any one of claims 7 to 10, wherein the means for securing the film in place includes a frame which is removable in the aperture to be screened.

13. A kit according to claim 12, wherein the film is tubular film and the tube is large enough to enclose the frame within the tube.

14. A kit according to any one of claims 7 to 13, wherein the film includes an ultra-violet absorbing constituent.

15. An air-permeable insect exclusion screen comprising a sheet of transparent perforated film stretched taut over an aperture to exclude insects from passing through the aperture.

16. A screen according to claim 15, wherein the film includes an ultra-violet absorbing constituent.

17. A kit according to any one of claims 7 to 14 or a screen according to either of claims 15 and 16, wherein the film is tinted.

18. A kit or a screen according to claim 17, wherein the film includes a coloured resin.

19. A kit according to any one of claims 7 to 14, 17 and 18, or a screen according to any one of claims 15 to 18, wherein the film is printed with an image covering a part of its surface area.

20. A method of excluding insects, substantially as hereinbefore described with reference to the accompanying drawing.

21. A kit of parts for exclusion of insects, substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawing.

22. An insect exclusion screen substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawing.

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